Light and Lighting

Official Journal of the Illuminating Engineering Society.

Incorporating "The Illuminating Engineer."

32, Victoria St., London, S.W.1.

Edited by J. STEWART DOW

Telephone: ABBey 5215

Vol. XXXVIII.—No. 6 June, 1945 PRICE NINEPENCE
Subscription 10/6 per annum, post free

Can Daylight Cost Too Much?

WE All Like Daylight. Yes. Windows we must have, both to allow Light to Get In and to allow Us to Look Out.

But how far are we prepared to go to ensure admission of daylight? Are our houses to be like the famous manor house of a squire with progressive ideas, "Hardwick Hall—More Glass than Wall," or going even further, are Houses of the Future to be built of Glass Bricks, in defiance of stone throwing or rockets? And if we live in congested areas where even such houses cannot ensure a high daylight factor everywhere, what then?

The question has a definite bearing on building construction of the future. Do physiologists and ophthalmologists consider high daylight factors essential—notwithstanding the expense and the headaches imposed on designers?

Or shall we call in the New World to redress the Balance in the Old—in other words, rely on artificial lighting with fluorescent lamps to supplement natural lighting, making good any deficiencies that building limitations may occasion?

Illumination Courses

It is surely an anomaly that, at the present moment, it is scarcely possible to name any British educational institution where adequate instruction in illuminating engineering is forthcoming. War conditions, certainly, have rendered regular courses of this kind almost unworkable. The demands on young people in the Forces and elsewhere have been too pressing; and even now, with the cessation of hostilities in Europe, the release of those in the twenties is still conjectural. Nevertheless the time is ripe to explore the situation, and it may be taken for granted that the I.E.S. is not unmindful of the problem. The aim should be to initiate at least a few courses of preparation for the City and Guilds examination in Illuminating Engineering. What form should such courses take? To our mind a complete full-time course in illuminating engineering, such as has been conducted at some American colleges and was developed at Dr. Teichmüller's institution at Karlsruhe, hardly seems likely to commend the necessary support as yet. Experience seems to show that evening courses, involving two or more lessons per week, are most feasible; certainly this makes easier the attendance of those who cannot always get release from jobs during the day and is more likely to win support from employers. It is interesting to note that a course on these lines is being initiated at Melbourne University. Students attend on Tuesday and Wednesday evenings from 7 p.m. to 9 p.m. The course consists of three terms and the fee is 30s. per term. It must be owned that the enterprise of colleges starting such courses before the war in this country was not always well rewarded. In the future, however, they should prove more attractive, especially if linked up with some scheme of practical training, yielding a prospect of employment in the lighting industry. We have spoken above of courses of a professional nature. Supplementary series of lectures of a general character—such of those arranged at the Polytechnic in London in 1933—attract audiences more readily. Whilst not to be regarded as giving specific *training* in illuminating engineering, they are well worth development. The same, of course, applies to occasional lectures to schoolchildren, which have already proved a great success.

Public Lighting Problems

The announcement, in our last issue, of the forthcoming meeting of the Association of Public Lighting Engineers, to be held in Glasgow next September, is an indication that street lighting problems are on the agenda once more. No doubt efforts of public lighting engineers during the immediate future will be concentrated mainly on restoration. In view of the general scarcity of apparatus and material they will be preoccupied with ways and means. But this is a passing phase. One hopes that ere long the fundamental problems will be taken up anew and there will be an opportunity to plan for the future. One would like to see some effort to carry into effect the main provisions of the M.O.T. Report, issued shortly before the outbreak of war, and to have available the long-awaited revised British Standard Specification, which has been the subject of so much discussion in committee. In the meantime, those concerned with street lighting would do well to brush up their recollections of these pre-war developments, and discussions thereon at I.E.S. meetings should be helpful. We notice that Professor T. David Jones presided over a meeting of the I.E.S. Cardiff Centre on June 7, when a useful resumé of the M.O.T. Report was given by Mr. C. R. Bicknell. We may take this opportunity of also referring readers to a recently issued review of street lighting developments up to 1939 by two other I.E.S. members, Mr. C. W. M. Phillips and Mr. R. H. Finch (B.T.H. Lighting Bulletin No. 6), of which we have received a copy. Here the recommendation in the Report in regard to mounting height, siting, etc., are well stated and illustrated by appropriate diagrams.

Aerial Reconnaissance: Light and Texture

An interesting and somewhat out-of-the-way lecture on the above subject was given by Mr. F. Darlington to the I.E.S. Bradford Group on May 29. The lecture was illustrated by aerial photographs taken at heights of from 50 to 30,000 ft. and at various speeds up to 450 m.p.h., projected by means of an epidiascope. The change in conditions with increasing height was graphically demonstrated. At 3,000 ft. the world still stood out with colours fully evident, but at 10,000 ft. and over all objects below appear in light and dark grey, without distinctive colour. Many of the pictures were interesting for the perfection of detail. Faces of persons on the ground could often be seen quite clearly, and the lecturer described how apparently hidden objects—such as mines laid below water level—were revealed in the photograph. After the lecture many questions were put to Mr. Darlington by members present and were answered, though he reserved the right to refuse any answers which might reveal confidential information. On the same date the annual general meeting of the Group was held. Mr. E. Lunn was elected chairman and Mr. J. T. Thornton vice-chairman for the coming session, Mr. E. Wood—who presented the first annual report of the Group—continuing as honorary secretary.

Let the Light In

It is pleasant to note the gradual disappearance of lingering traces of the black-out—the destruction, for instance, of brick partitions blocking the entrance of daylight into subways and stairs leading to tube stations. In few places have black-out restrictions been so irksome as in trains and on railway stations, where feebly lit signs in minute letters constantly left passengers in doubt in regard to destination. The removal of the webbing on Underground tube carriages, though proceeding but slowly, is another welcome step. One recalls that "that stuff was there for our protection." It is perhaps hardly worth while discussing now whether the device was justified on trains spending so much of their time underground. Certainly the luminous veil imposed by the webbing made it most difficult to distinguish names of stations—normally so evident when the view is unobstructed. One hopes that full restoration of lighting in the tubes is not far distant. Though vastly better than in the worst period of fuel economy it is still far from normal—as one realises in occasional trains equipped with new lamps in clean reflectors. In some cases, too, results of incidents have gone far to invalidate even the present lighting. On most of the escalators the conditions are now much better than they were, but at one station, at least, where there is now no effective light-reflecting surface overhead to respond to the indirect lighting equipment, it is well nigh impossible to observe whether the escalator is in motion or not. The lighting of many direction signs could also be vastly improved—but these are all things that will right themselves as material and labour become available.

Wedge Lighting

Forms of illuminated signs, making use of total internal reflection within a glass plate with parallel sides were familiar in the days when the exhibition of such luminous signs was usual and permissible. In America (*Illuminating Engineering*, February, 1945), a variant of this idea, involving the use of a wedge of glass, is illustrated. Any transparent medium with parallel, or sides of uniform cross section, will "pipe light." The so-called "edge lighting" is based on this principle. The adoption of a wedge, however, appears to have certain advantages and permits the light to be controlled to a great extent. If an illuminated solid wedge is placed over any flat object (such as a picture or map) an area of it equal to the wedge's major dimensions is illuminated, the illuminated object being seen through the transparent wedge.

Peep-Hole Control

In the *Evening Standard* various curious peep-holes, such as the one in the vestry door of the City Temple, which enabled Joseph Parker to assess the size of his congregation, are recalled. This particular peep-hole has disappeared as the result of the blitz. The same applies to another aperture in a little cubby hole in the House of Commons, where an official of the engineer's department once kept watch all through the summer afternoons. His job was to keep the sun out of the Prime Minister's eyes. Shafts of coloured light from the stained-glass windows spot-lighted the Treasury bench and caused inconvenience. The man at the peep-hole worked hydraulic blinds and kept Ministers in the shade. When the sun went down he went home.

Contrast and Glare

It is not always sufficiently realised that evils are usually due to *excess*. The same quality that is helpful in moderation becomes a menace if we have too much of it.

This is emphatically true in regard to contrast, which is essential to the clear recognition of objects and yet may become fatiguing if too pronounced; it may actually degenerate into glare or dazzle if pushed to still greater lengths. Long before this point is reached, however, unsatisfactory contrast conditions may become prejudicial, either by distracting our attention or by impairing ability to see well.

All this is well illustrated in a recent article in "Specification" by Mr. William Allen, who reviews the work of the D.S.I.R. Study Committee, to which he himself made useful contribution. After asking "What is good environment for vision?" he propounds two main principles:—

(1). Our eyes tend automatically to direct themselves to the brightest things in view, and to focus on a contrast, and

(2). Our ability to see is impaired by glare.

We have therefore to ensure so far as possible that our light sources, i.e., windows and artificial lighting fittings, provide light and contrast where it is wanted, but do not, by their own brightness and contrast, forcibly demand our attention.

Three Basic Principles

As indicated above, glare arises fundamentally in conditions of contrast. If the object of attention is too bright in comparison with its background (as in cinema theatres where films are shown in complete darkness and the screen has a densely black surround) the effect is annoying. Annoyance becomes still more intense when there are unduly bright objects in the background, so that the peripheral field becomes brighter than the centre. The basis of design, therefore, is to secure that:—

(1). The object of attention should be bright and contrasty.

(2). It should not be too much brighter than the immediate background and the general environment.

(3). The environment should not contain strongly competing brightnesses and contrasts.

Importance of Background

The object of attention may take various forms. It may be paintings on the walls, neighbours round a table in a restaurant, the speaker at a meeting, or the whole lower part of a room where we may wish to sit and talk. Sometimes the object of attention may not be present until we put there, for example, a book, the pages of which provide their own contrast, but should be the brightest thing in view. There must be brightness and contrast on such things so as to draw our attention, and they must be found clearly visible and well defined.

Brightness and contrast are functions not only of light and shade but also of colour. The deliberate use of colour to improve visibility is a conception familiar in the U.S.A. and now becoming popular here. In factories it has found extensive use. In the U.S.A. pairs of contrasting colours of fairly high reflecting value have been marketed for use in colouring the main parts of machines.

Mr. Allen argues against systems of lighting professing to be "shadowless," contending that shadow is helpful in securing contrast, and that in general main lighting from some specific direction, with relief of shadows by moderate light from a second source, is desirable. Local lighting, supplementing general lighting, may give a sense of "intimacy" valuable in restaurants. Objects should not stand out too

brightly, and dramatic effects should be used with caution. A moderate contrast behind a task is agreeable. In the U.S.A. this has sometimes been provided by furnishing each machine with its own local background-screen, which moves with it if the operator changes his position.

Glare from Windows

Windows, because of their excessive contrast with adjacent walls, often offend against principle (3). In medieval and Georgian designs the thick walls and deep reveals give some relief. Splays and light-painted linings likewise lessen the transition. Window glare can be diminished by ensuring that light falls on the adjacent wall areas. Clerestories or windows in opposite walls may serve this purpose, or fluorescent artificial lighting may be used with the same end in view. The modern "window wall," by doing away with the surround, also does away with undue contrast. Contrast due to heavy window bars and frames is often objectionable.

Artificial Lighting Contrasts

With artificial lighting the same principles apply. If sources of light are intended to be seen they should be viewed against a light background; this may be one main reason for the popularity of light-coloured surroundings. Artificial daylights, if poorly designed, are open to the same drawback as windows, of leaving the surrounding surface relatively dark.

In conclusion Mr. Allen reminds his readers that irritating sensations are often not only acceptable but agreeable in mild form. Thus mild forms of glare such as the sparkle of ornament, the brilliance of polished shapes, and the effect of light on tumbling water, may be pleasant to watch.

The Choice of the People

A "Gallup type" poll was recently conducted by the "Small Homes Guide" (U.S.A.) with the object of ascertaining which types of lighting fittings are likely to be most in demand in small homes of the future. A series of 24 specific lighting fittings was submitted. Readers were asked, "How many of these lighting features do you want in your future home?"

The fittings illustrated all served some useful purpose. The replies of the 777 persons approached did, however, indicate preferences—or at any rate differing views in regard to relative importance—though all the fittings received a good measure of support, the smallest vote being 33 per cent, about a third of persons approached.

An easy first was the "light that illumines your doorstep, marks your home for strangers, welcomes friends." Next in order were fluorescent tubes on either side of the bathroom mirror (78 per cent.), and interior lighting in the cupboard (67 per cent.). In a sense, therefore, the three first choices were special gadgets.

After this more homely and essential devices received support, i.e., lights over the kitchen table (50 per cent.), study lamps (49 per cent.), stair lights (48 per cent.), and lights over sinks and laundry tub (41 per cent.). No single feature was mentioned by everyone. Of the first eight features three relate to the kitchen, and of these light over the sink comes first.

It might be inexpedient to attach too great significance to the order of choice. But such inquiries serve a most useful purpose, firstly in leading the householder to think about domestic lighting, and secondly in giving him or her an idea of the variety of devices now available.

Mr. E. Stroud's New Appointment

It is a somewhat unusual event for an I.E.S. president to take up a new appointment during his term of office. Readers, therefore, and I.E.S. members in particular, will note with considerable interest the appointment of Mr. E. Stroud as Technical Director of the Brighton Lighting and Electrical Engineering Co., Ltd. The appointment takes effect from July 1 onwards—thus coinciding with the termination of the I.E.S. session.

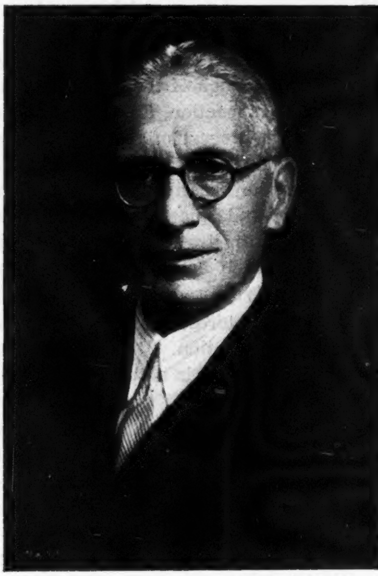
Mr. Stroud, as is well known, has been associated with Holophane, Ltd., for a long time. Indeed, with the exception of a three-year break in 1916, when he served as a technical officer in the R.N.V.R., and subsequently in the (then newly formed) R.A.F., his period of service from 1914 onwards has covered more than 30 years—initially as chief engineer and, from 1940 onwards, as general sales manager.

During the same period Mr. Stroud has rendered signal services to the Illuminating Engineering Society, of which he became a member in 1913. He has served in turn as Member of Council, Honorary Treasurer, Vice-President, and, finally, as President during the present year—one of great moment in the history of the Society. He has served on many committees both of the I.E.S. and the British Standards Institution, identifying himself particularly with such matters as the design of photometric apparatus and lighting fittings, the study of light distribution, and the development of street lighting—both of the normal and "wartime" variety.

In this particular field—public lighting—he may claim to have exceptionally wide experience and specialised knowledge acquired during the past 20 years and supplemented by contact with local authorities. He was one of the earliest members of the Association of Public Lighting Engineers.

This knowledge should prove of considerable benefit to the Brighton Lighting and Electrical Engineering Company, an old-established concern which, under the management of Mr. Ernest Heaps during the last 23 years, has been identified with the manufacture of street lighting equipment and control gear.

The moment is certainly an auspicious one on which to initiate developments in this field, as there will surely be urgent demands for many years to come. We wish Mr. Stroud every success in his new work.



[Photo by Vandyke

Mr. Ernest Stroud, whose appointment with the Brighton Lighting and Electrical Engineering Co. Ltd. has recently been announced.

I.E.S. Opening Sessional Meeting, October 9, 1945

The opening meeting of the forthcoming I.E.S. session will take place in London at 5.30 p.m. on **Tuesday, October 9,** when the incoming president, Mr. H. C. Weston, will deliver his **Presidential Address.**

Seeing Fine Details

In a lecture recently delivered to the Birmingham branch of the Institution of Engineering Inspection, Dr. J. H. Nelson discussed the process of seeing and the relation of lighting conditions thereto. In so doing he described the operation of the eye, and quoted from Lythgoe and others to illustrate the conditions of brightness which enable it to perform most efficiently.

Of special interest was the author's analysis of perception. It is not always realised that vision is a somewhat complex process and that perception may involve quite a number of different operations.

Visual acuity, in the broad sense, is usually ascertained in terms of the smallest objects that can be distinguished one from another, e.g., two bright points, two black spots, or two black lines. The visual resolution in all these cases is about one minute of arc or 0.003 inch at 10 inches. Detection, when two lines are slightly out of alignment ("Vernier acuity"), is something different. The limit of discrimination here is about 10 seconds of arc or 0.0005 inches at 10 inches from the eye. There is, however, a third process, spatial perception or the recognition of *depth* ("stereoacuity"). This involves the combined effort of the two eyes, an effort which depends greatly on personal characteristics and may involve considerable strain. (When very fine objects have to be examined at close quarters special spectacles may be even more valuable than high illumination, as Weston has shown.)

It is a matter for consideration whether these various processes—and the further quite distinct process of perception of small contrasts in light and shade—react to increasing illumination in the same way. Dr. Nelson remarks that the relationship between stereoacuity and brightness does not appear to have been studied in detail—though brightness is doubtless of paramount importance.

We may facilitate seeing both by providing adequate brightness and by adjustment of the task itself. Dr. Nelson reproduces Lythgoe's diagram, illustrating the importance of background, which should be somewhat less bright than that of the object but never brighter. This dictum presumably applies to processes in which recognition of light and shade is involved. Background brightness is evidently settled by other considerations when perception of outline, vernier acuity, or stereoacuity are concerned, and there is perhaps something yet to be learned in this connection.

Finally, there is one other element in seeing which people are apt to disregard—the time of observation. The importance of the time element was well illustrated in "The Time Machine" by H. G. Wells, in which the author spoke of *duration* as the fourth dimension—an object must exist for an appreciable interval of time in order that we may become aware of it—and must remain in position for a sufficient time to be seen. When any critical observation is concerned the observer should clearly have ample time for observation.

If the object is not stationary but in motion the time available for observation becomes still more important. The name of a station can only be recognised with difficulty when seen from an express train. Bullets fired from a rifle are invisible; so, too, were the rockets experienced by those in and around London, though the slower-moving flying bombs could be clearly seen. Familiar experiments have shown that in weak illuminations an object appears to move much more quickly than when the illumination is high. It is even possible that the fact that it *is* in motion may escape notice.

Circuits For Discharge Lamps

Summary of a paper read by Mr. R. Maxted and Mr. J. N. Hull at a Sessional I.E.S. Meeting in London on April 18th.

The Illuminating Engineering Society went out of its ordinary orbit a little on April 18, when Mr. R. Maxted and Mr. J. N. Hull read a paper on "Circuits for Discharge Lamps." The subject matter, perhaps, falls within the scope of electrical engineering rather than illuminating engineering, but nevertheless this is material with which lighting experts would do well to have more than a bowing acquaintance.

The paper examined variations and tendencies in circuit practice as applied to electric discharge lamps in general use. Here, both matters of principle and practical convenience must be considered. To a great extent one has to compromise between perfection from the physical standpoint and simplicity of form. The demand for new and improved light sources has brought with it new phenomena and variation in technique in lamp control circuits. At the same time installation, design, and performance were having an increasing influence on the choice of circuits.

The authors discussed at some length the basic problem of arc stabilisation and reviewed available forms of wattage controlling devices, including various forms and combinations of inductance, capacitance, and resistance ballast. Diversity between past and present practice is evident in the manner of initiating the discharge and the authors' analysed methods applied to various forms of lamps—circuits commonly used with high-pressure mercury vapour, sodium, neon, and tubular fluorescent lamps were illustrated, and operation on both a.c. and d.c. supply was considered.

In the concluding part of the paper American practice was briefly reviewed and the effect of variation of circuit estimated. The need for maintaining relatively close tolerances in the manufacture, even of "the humble choke," was stringly emphasised. Reference was made to various outstanding problems such as cyclic variation in light, suppression of troublesome noise, and avoidance of radio interference. The potential advantages of high-frequency power supplies were also touched upon.

The paper was illustrated by a wealth of diagrams, and it was a revelation to many of those present to discover what a remarkable amount of work has been done in this field. Several speakers commented upon the nuisances of noise and flicker, which was definitely troublesome in certain circumstances; for example, in schools and hospitals. The rather cumbersome and unsightly appearance of auxiliaries was mentioned and some envy was expressed of the "slick," small, and relatively light apparatus usual in America.

A number of speakers also referred to power factor correction—a very important condition, the importance of which many users do not seem to realise. It was pointed out that some of the weaknesses in present designs were directly attributable to war conditions, e.g., inability to utilise certain desirable but scarce materials, concentration on uniformity of type not always the best for local conditions, etc. The "blink," on starting, was mentioned as a common defect. Mr. Maxted, in his reply, made reference to "no blink" devices which were used in America to cut lamps out of circuit as soon as the defect appeared. Other matters discussed included the design of special lamps for operation on d.c., the possibility of running lamps in series for railway systems, etc., and the advantages of adopting exceptionally high frequencies, such as had been adopted during the war for a number of special installations.

Colour Television

At the meeting of the Colour Group held at the headquarters of the Royal Photographic Society on May 30, a very interested audience listened to a talk by Mr. L. C. Jesty, of the G.E.C. Research Laboratories, on the present state of colour television.

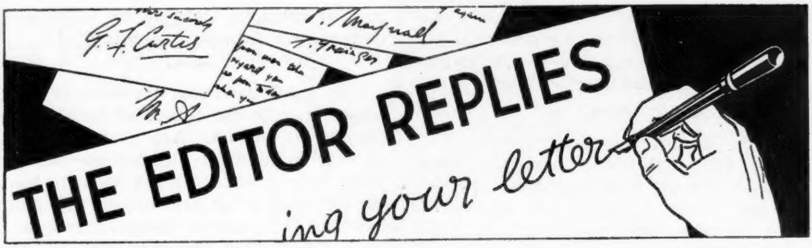
Taking the transmitting end and the iconoscope more or less for granted, Mr. Jesty concentrated on a description of the method by which the picture is re-formed at the receiving end. In essence, the picture is built up of an array of horizontal lines formed by the passage of a very narrow beam of cathode rays moving with extreme rapidity across the fluorescent screen at the end of a cathode-ray tube. The whole area of the screen is "scanned" in this way 50 times per second in ordinary monochrome television, and the picture is formed by modulation of the intensity of the beam as it travels in synchronism with the scanning beam at the transmitting end.

There are, of course, several different systems which have been devised for the production of a coloured picture, and the lecturer gave a general outline of several of these, but the one with which he was principally concerned depended on the use of a triple scanning of the screen, once to produce a red picture, once to produce a blue, and once for a green. If these pictures succeed one another with sufficient rapidity, persistence of vision—that invaluable friend—causes them to blend into a single multi-coloured picture which is, within the limits of the various devices employed, a faithful copy of the original scene. Theoretically the whole cycle of the three individual pictures should be gone through 50 times per second, but this involves 150 single scans in a second and necessitates such a reduction in the wave-length used for the transmission that reflections from very large objects in the landscape may cause trouble. Mr. Jesty said that experiments had been carried out to find what lower rate of scanning could be tolerated on the ground that something in the quality of a monochrome picture might be sacrificed if the picture were coloured. The conclusion which had been arrived at was that 100 scans per second would be acceptable, and in consequence it was proposed to standardise on this rate. To illustrate his point, the lecturer showed two cinema films of the same scene, one monochrome and one coloured, the monochrome being projected on the screen just above the coloured picture. The latter was taken with two-thirds the number of frames used in the former, and the audience was invited to express an opinion as to the relative merits of the two.

One difficulty which the lecturer mentioned was the appearance of a rapidly moving object, such as a wheel. If the whole screen was scanned without interlacing, such an object would appear in triplicate, one image for each colour. For this reason an interlacing system of scanning was employed. Further, in reply to a question asked in the discussion, he said that there was a preferred order for the three colours.

The lecture was followed by a very good discussion in which questions were asked concerning the characteristics of the fluorescent materials used for the cathode-ray screen, particularly the spectral distribution of the light emitted and the rate of extinction of the brightness excited by the cathode rays.

After hearing this lecture the audience was undoubtedly left with the impression that colour-television was just "round the corner." It cannot fail to make still further demands on the ingenuity and skill of the radio-engineer, but that the remaining difficulties will be overcome there can be no reasonable shadow of doubt, and that, probably, far sooner than any one of Mr. Jesty's audience would have ventured to prophesy before they had had the pleasure of listening to his inspiring lecture.



One device mentioned in the recent address given by Dr. W. R. G. Atkins, following the I.E.S. annual general meeting, has excited some interest—the use of a **small diffusing hemisphere,** as a substitute for a flat surface, in order to measure **"total illumination"** from daylight. Values obtained by this method should integrate both horizontal and vertical illumination and should be independent of the altitude of the sun, except for the greater absorption of light which occurs when the sun is near the horizon.

There have been some who have advocated this method in dealing with artificial lighting. Measurement of illumination in a horizontal plane has great advantages—notably the fact that such a surface is illuminated by light coming from all directions—but in certain instances it has been urged that illumination in *the vertical plane* is most important. There is also the consideration that measurement of illumination on the horizontal working plane may not give due credit to the lighting of the upper parts of a room, i.e., walls and ceilings, on which the general impression of brightness greatly depends. It may, therefore, operate rather unfairly towards indirect as compared with direct lighting systems.

There is something to be said for this view. Measurements of the brightness of a diffusing hemisphere would, however, possibly err in the other direction, i.e., they would tend to measure the **total light flux** emitted into a room, irrespective of distribution and disregarding the utilisation factor.

My comments on **formulae for the limitation of direct glare** from light sources have led to inquiries in regard to what can be done to minimise **reflected glare.** I do hold very strongly that the reflection of light from polished surfaces — sometimes a menace but sometimes an aid to vision, and even an essential element for some special process—needs much more study. I suspect that it plays an important part in industrial lighting. Sometimes it may furnish an explanation why workers cling obstinately to some mode of lighting; for example, the use of local shaded lights even when a particularly high illumination does not seem necessary.

Generally speaking, methods of limiting direct glare such as the setting of limits to brightness of sources, also help to reduce reflected glare. So, too, does the maintenance of moderate brightness of the background which helps to soften contrasts. Beyond this it seems rather difficult to go. I recall that **the Australian I.E.S. Code** (one of special interest because of its praiseworthy attempt to deal with *quality* besides *intensity of light*) fixes exceptionally low brightness limits for sources liable to become visible by reflection in polished surfaces. It does seem, however, that it would be very difficult to apply such low limits in practice—apart from the fact that for certain pro-

cesses, e.g., examining polished metal for flaws, reflection from a source of extensive area and relatively high brightness may sometimes be necessary.

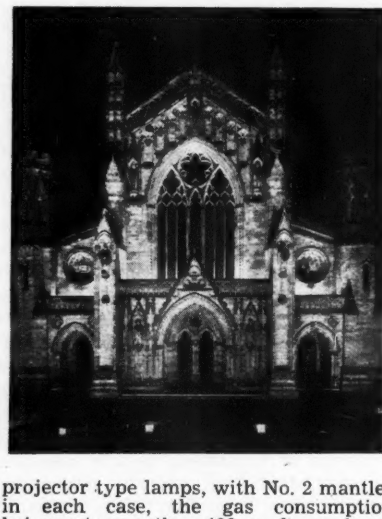
Moreover, for this particular form of glare, **the distinction between "discomfort glare" and "disability glare"** is important. It might be (as in the case mentioned above) that prolonged use of a certain degree of brightness would give rise to discomfort; and yet, for occasional use, this brightness might be necessary in order to secure fine discrimination and so enable small flaws to be detected. Again, even a brightness no higher than that of the illuminated task, or even lower, which certainly should not give rise to discomfort may, from the disability standpoint, prove a drawback. An extreme case is presented by the **face of a clock or watch.** A reflection of a surface of quite mild brightness may make it impossible to see the position of the hands. In the case of a book **printed on glazed paper** all direct reflection comparable in brightness with that of the page produces a "veiling haze" which impairs the clearness of text and illustrations. The only real remedies here are (a) to avoid the use of glazed paper or (b) to adjust the relative positions of paper and source of light so that no regularly reflected light enters the eye.

I have been asked again in regard to the conclusions to be drawn from the work of Garrod ("Light and Lighting," April, 1944, p. 62) in regard to the **germicidal effect of diffused daylight.** Dr. Garrod suggested that this, as well as direct sunlight, is of definite hygienic value. There is much discussion taking place in regard to **daylight factors for buildings of the future.** There has been a tendency, in studies conducted during the war period, to call for admission of daylight beyond what was considered practicable in the past. The question is, how far is it justifiable to incur the special design and the considerable extra expense involved (some authorities consider it may prove quite prohibitive), instead of relying on improved artificial lighting to make good deficiencies in natural lighting?

I do not regard this question, of great importance to the future of building, as completely settled. Any evidence available from medical authorities—who, it must be confessed, do not seem to have spoken with great decision on this point—would be valuable, though it may well be claimed that the provision of adequate window space is a matter of amenity and does not depend only on hygiene in a technical sense.

Floodlighting at Hereford

An impressive spectacle was provided on VE-Day in Hereford by the gas floodlighting of the cathedral. Excellent results were obtained with the use of eleven 10-lt. upward beam and five 3-lt.



projector type lamps, with No. 2 mantles in each case, the gas consumption being not more than 400 cu. ft. per hour. The equipment was installed with commendable speed in two days by the Corporation gas engineers, and the brilliant lighting thus obtained showed the beautiful structure of the cathedral to the fullest advantage. The cathedral was last flood-lit during the Coronation festivities in 1937

Light Sensitive Film and Paper

A new British Standard Specification (B.S.1193: 1945) dealing with light sensitive film and paper, prepared by a technical sub-committee of the Photographic Industry Committee, has been issued. The specification deals with such factors as nominal width, length, thickness, perforations, and cores and winding. Its general adoption would be of great benefit in reducing sizes to an acceptable minimum range and facilitating the supply of material from stock.

"Perspex" Plastic Material

A stage has now been reached when many special materials developed for war purposes are being released for general use. An instance is afforded by "Perspex," the clear, transparent methyl methacrylate sheet manufactured by the Plastic Division of Imperial Chemical Industries. This material has had a remarkable war record and has been used on battlefields in all parts of the world, from the North Atlantic to the jungles of New Guinea, successfully surviving great extremes of climate. As an aircraft glazing material it has stood the test of outdoor exposure for five years without distortion, cracking, or other deterioration.

It has already found application for lighting fittings, the guarding of machinery, button manufacture, and the production of many articles of domestic equipment. Its utilisation by the lighting industry will be watched with general interest.

Retirement of Mr. A. E. Jepson

The retirement of Mr. A. E. Jepson, after 40 years' service with the General Electric Company, Ltd., has recently been announced. Mr. Jepson, who first joined the G.E.C. in 1900, was for nine years manager in London of the Switchgear and Instruments Department. Mr. Jepson had wide interests. He was a member of old-standing of the I.E.S., of which he became a Fellow. He was likewise associated with the I.E.E., the Association of Public Lighting Engineers, the Institution of Heating and Ventilating Engineers, the Electric Power Engineers' Association, and the Royal Society of Arts.

A presentation was recently made to Mr. Jepson by his colleagues on the occasion of a dinner to commemorate his retirement. His many friends will join in wishing him long enjoyment of the leisure he has so well earned.

Fig. 1. Engineering shop lighted by 500 w. tungsten lamps in dispersive fittings.

Industrial Lighting

The adjacent pictures show lighting conditions in sections of the Vickers-Armstrong Works (Tean Valley). The lighting scheme shown in Fig. 1, consisting of 500 w. tungsten lamps in dispersive fittings, mounted 14 ft. above the floor, is of conventional design, but the light walls and floor result in an exceptionally good effect, with a service illumination of 12-15 ft.c. An emergency low-voltage lighting system, supplementary to the main lighting and supplied by storage batteries, is also provided. In the inspection dept. (Fig. 2) 25-30 ft.c. is obtained from 80 w. 5-ft. fluorescent lamps in continuous troughing mounted 10 ft. above floor level. The lighting was designed by Metropolitan-Vickers, Lighting Engineers, and the wiring installation carried out by F. Reid, Ferens and Co., Ltd., of Sunderland.

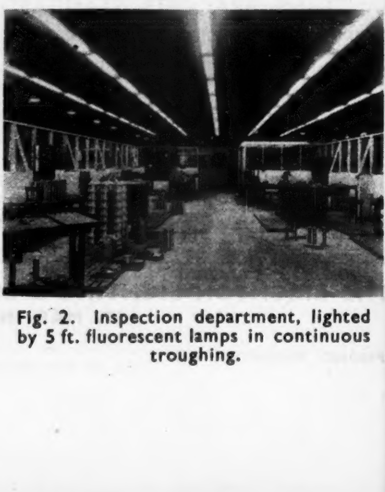


Fig. 2. Inspection department, lighted by 5 ft. fluorescent lamps in continuous troughing.

945

ng
rs-
The
st-
er-
the
the
ep-
lu-
acy
en-
ied
In
, is
ent
ted
vas
ht-
ion
Co.,

d
s